AHRQ Healthcare Horizon Scanning System – Potential High-Impact Interventions Report

Crosscutting Interventions and Programs

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Statement of Funding and Purpose
This report incorporates data collected during implementation of the Agency for Healthcare Research and Quality (AHRQ) Healthcare Horizon Scanning System by ECRI Institute under contract to AHRQ, Rockville, MD (Contract No. HHSA290201000006C). The findings and conclusions in this document are those of the authors, who are responsible for its content, and do not necessarily represent the views of AHRQ. No statement in this report should be construed as an official position of AHRQ or of the U.S. Department of Health and Human Services.

This report's content should not be construed as either endorsements or rejections of specific interventions. As topics are entered into the System, individual topic profiles are developed for technologies and programs that appear to be close to diffusion into practice in the United States. Those reports are sent to various experts with clinical, health systems, health administration, and/or research backgrounds for comment and opinions about potential for impact. The comments and opinions received are then considered and synthesized by ECRI Institute to identify interventions that experts deemed, through the comment process, to have potential for high impact. Please see the methods section for more details about this process. This report is produced twice annually and topics included may change depending on expert comments received on interventions issued for comment during the preceding 6 months.

A representative from AHRQ served as a Contracting Officer's Technical Representative and provided input during the implementation of the horizon scanning system. AHRQ did not directly participate in horizon scanning, assessing the leads for topics, or providing opinions regarding potential impact of interventions.

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Preface

The purpose of the AHRQ Healthcare Horizon Scanning System is to conduct horizon scanning of emerging health care technologies and innovations to better inform patient-centered outcomes research investments at AHRQ through the Effective Health Care Program. The Healthcare Horizon Scanning System provides AHRQ a systematic process to identify and monitor emerging technologies and innovations in health care and to create an inventory of interventions that have the highest potential for impact on clinical care, the health care system, patient outcomes, and costs. It will also be a tool for the public to identify and find information on new health care technologies and interventions. Any investigator or funder of research will be able to use the AHRQ Healthcare Horizon Scanning System to select potential topics for research.

The health care technologies and innovations of interest for horizon scanning are those that have yet to diffuse into or become part of established health care practice. These health care interventions are still in the early stages of development or adoption, except in the case of new applications of already-diffused technologies. Consistent with the definitions of health care interventions provided by the Institute of Medicine and the Federal Coordinating Council for Comparative Effectiveness Research, AHRQ is interested in innovations in drugs and biologics, medical devices, screening and diagnostic tests, procedures, services and programs, and care delivery.

Horizon scanning involves two processes. The first is identifying and monitoring new and evolving health care interventions that are purported to or may hold potential to diagnose, treat, or otherwise manage a particular condition or to improve care delivery for a variety of conditions. The second is analyzing the relevant health care context in which these new and evolving interventions exist to understand their potential impact on clinical care, the health care system, patient outcomes, and costs. It is NOT the goal of the AHRQ Healthcare Horizon Scanning System to make predictions on the future use and costs of any health care technology. Rather, the reports will help to inform and guide the planning and prioritization of research resources.

We welcome comments on this Potential High-Impact Interventions report. Send comments by mail to the Task Order Officer named in this report to: Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, MD 20850, or by email to: effectivehealthcare@ahrq.hhs.gov.

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Background

Horizon scanning is an activity undertaken to identify technological and system innovations that could have important impacts or bring about paradigm shifts. In the health care sector, horizon scanning pertains to identification of new (and new uses of existing) pharmaceuticals, medical devices, diagnostic tests and procedures, therapeutic interventions, rehabilitative interventions, behavioral health interventions, and public health and health promotion activities. In early 2010, the Agency for Healthcare Research and Quality (AHRQ) identified the need to establish a national Healthcare Horizon Scanning System to generate information to inform comparative-effectiveness research investments by AHRQ and other interested entities. AHRQ makes those investments in 14 priority areas. For purposes of horizon scanning, AHRQ's interests are broad and encompass drugs, devices, procedures, treatments, screening and diagnostics, therapeutics, surgery, programs, and care delivery innovations that address unmet needs. Thus, we refer to topics identified and tracked in the AHRQ Healthcare Horizon Scanning System generically as "interventions." The AHRQ Healthcare Horizon Scanning System implementation of a systematic horizon scanning protocol (developed between September 1 and November 30, 2010) began on December 1, 2010. The system is intended to identify interventions that purport to address an unmet need and are up to 4 years out on the horizon and then to follow them up to 2 years after initial entry into the health care system. Since that implementation, review of more than 16,000 leads about potential topics has resulted in identification and tracking of about 1,800 topics across the 14 AHRQ priority areas and 1 cross-cutting area; about 600 topics are being actively tracked in the system.

Methods

As part of the Healthcare Horizon Scanning System activity, a report on interventions deemed as having potential for high impact on some aspect of health care or the health care system (e.g., patient outcomes, utilization, infrastructure, costs) is aggregated quarterly. Topics eligible for inclusion are those interventions expected to be within 0–4 years of potential diffusion (e.g., in phase III trials or for which some preliminary efficacy data in the target population are available) in the United States or that have just begun diffusing and that have completed an expert feedback loop.

The determination of impact is made using a systematic process that involves compiling information on topics and issuing topic drafts to a small group of various experts (selected topic by topic) to gather their opinions and impressions about potential impact. Those impressions are used to determine potential impact. Information is compiled for expert comment on topics at a granular level (i.e., similar drugs in the same class are read separately), and then topics in the same class of a device, drug, or biologic are aggregated for discussion and impact assessment at a class level for this report. The process uses a topic-specific structured form with text boxes for comments and a scoring system (1 minimal to 4 high) for potential impact in seven parameters. Participants are required to respond to all parameters.

The scores and opinions are then synthesized to discern those topics deemed by experts to have potential for high impact in one or more of the parameters. Experts are drawn from an expanding database ECRI Institute maintains of approximately 350 experts nationwide who were invited and agreed to participate. The experts comprise a range of generalists and specialists in the health care sector whose experience reflects clinical practice, clinical research, health care delivery, health business, health technology assessment, or health facility administration perspectives. Each expert uses the structured form to also disclose any potential intellectual or financial conflicts of interest

(COIs). Perspectives of an expert with a COI are balanced by perspectives of experts without COIs. No more than two experts with a possible COI are considered out of a total of the seven or eight experts who are sought to provide comment for each topic. Experts are identified in the system by the perspective they bring (e.g., clinical, research, health systems, health business, health administration, health policy).

The topics included in this report had scores *and/or* supporting rationales at or above the overall average for all topics in this priority area that received comments by experts. Of key importance is that topic scores alone are not the sole criterion for inclusion—experts' rationales are the main drivers for the designation of potentially high impact. We then associated topics that emerged as having potentially high impact with a further subcategorization of "lower," "moderate," or "higher" within the high-impact-potential range. As the Healthcare Horizon Scanning System grows in number of topics on which expert opinions are received and as the development status of the interventions changes, the list of topics designated as having potentially high impact is expected to change over time. This report is being generated twice a year.

For additional details on methods, please refer to the full AHRQ Healthcare Horizon Scanning System Protocol and Operations Manual published on AHRQ's Effective Health Care Web site.

Results

The table below lists five topics for which (1) phase II or III data for devices and procedures or some human data for programs were available; (2) information was compiled by May 16, 2013, in this priority area; *and* (3) we received five to nine sets of comments from experts between October 25, 2011, and May 18, 2013. (Twelve topics in this priority area were being tracked in the system as of May 18, 2013.) We present summaries on those five topics (indicated below by an asterisk), all of which were deemed to have potentially higher-impact potential on the basis of expert comments. The material on interventions in this Executive Summary and report is organized alphabetically. Readers are encouraged to read the detailed information on each intervention that follows the Executive Summary.

Priority Area 15: Crosscutting Interventions and Programs

Topic	High-Impact Potential
1. *Community paramedicine to improve care access in rural areas	High
2. *Intelligent pills (Proteus Digital Health Feedback System) to monitor patient medication adherence	Lower end of the high-impact-potential range
3. *Motivational interviewing in the pharmacy setting to improve patient medication adherence	Moderately high
4. *Partnering urban specialists with rural primary care clinicians for treatment of complex, chronic conditions	High
5. *Senior-specific emergency departments for treatment of elderly patients	Lower end of the high-impact-potential range

Discussion

We created this priority area to capture crosscutting interventions that affect two or more of AHRQ's 14 priority areas. Some of these interventions are health care technologies and others are programs, services, or care-delivery innovations.

Community Paramedicine to Improve Care Access in Rural Areas

- **Key Facts:** For many reasons, access to primary care in rural and remote regions is limited, and this shortage can prompt patients to inappropriately use emergency medical services (EMS) and ambulance transport to the emergency department (ED). This is especially a problem with nonemergency medical issues, home-health or social-service conditions, and medical issues that could have been prevented if the patient had had regular access to primary care. The community paramedicine model uses EMS personnel (paramedics) to provide specific primary care services in a patient's home, with the ultimate goal of improving health outcomes among medically vulnerable populations while reducing unnecessary ambulance transports, ED visits, and hospital readmissions. Several versions of this model are being implemented in the United States, and we describe one of those models in this report. The community paramedicine model is not intended to replace current home-health services; rather, it is intended to provide a means of extending the reach of primary care providers to patients who lack access to these services.
- **Key Expert Comments:** Experts thought that this model could successfully meet the need for improving primary care access in rural areas. Experts expected to see the program's most dramatic effects in reduced health care costs, improved health disparities, and better patient management and health outcomes.
- **Potential for High Impact:** High

Intelligent Pills (Proteus Digital Health Feedback System) to Monitor Patient Medication Adherence

- **Key Facts:** The Proteus Digital Health™ Feedback System (Proteus Digital Health, Inc., Redwood City, CA), a form of smart-pill technology, is being investigated to treat chronic diseases requiring ongoing medication, such as tuberculosis, diabetes, heart failure, AIDS, hepatitis C virus infection, and mental health disorders. The technology consists of an ingestible sensor (formerly known as an Ingestible Event Marker or IEM), affixed to conventional pharmaceuticals (i.e., pills), a personal monitor, and a Bluetooth-enabled data device such as a cell phone. Digestive fluids activate the ingestible sensor, made from common food ingredients, when the sensor reaches the stomach. The personal monitor is a miniaturized, battery-operated, data-logging device that patients wear as a patch on the torso to record heart rate, activity, ingestion of monitored medications, and patient-logged events such as symptoms. When a patient ingests a monitored pill, the activated ingestible sensor transmits its unique signature to the personal monitor, which records and timestamps the event along with physiologic data, such as heart rate. The personal monitor transmits collected patient data to the patient's Bluetooth-enabled cell phone or other computerized device. Data are then encrypted and forwarded to a secure database that clinicians can access to review the patient's condition. In results of a trial of 111 patients who ingested 7,144 monitored pills, investigators reported that the system's positive and negative ingestible-marker detection accuracy was more than 97%, and medication adherence was more than 85%. The most common adverse effect was mild skin rash from the monitor's electrodes; no serious adverse events were reported. The company received marketing clearance from the U.S. Food and Drug Administration for the monitoring device in March 2010 and marketing clearance for the ingestible sensor in July 2012.
- **Key Expert Comments:** Experts commenting on this topic agreed that this technology could have a significant impact on many health system parameters if adopted, although

some of the experts were skeptical about this intervention's potential to actually improve medication adherence and health outcomes, because of the many variables affecting adherence, including affordability of medication and side effects. Some experts believe patient acceptance of the marked pills might be low, although one expert thought that elderly patients living alone might be more likely to adopt this technology. Some experts also thought clinician acceptance might be a barrier to adoption because the technology might increase time and infrastructure needed to review data and alter patient management as a result. Nonetheless, the technology was thought to be capable of providing data that could provide more insight into patient behavior regarding medication use, and that insight might enable clinicians to explore with patients issues that the clinicians might not otherwise be aware of.

- **Potential for High Impact:** Lower end of the high-impact-potential range

Motivational Interviewing in the Pharmacy Setting To Improve Patient Medication Adherence

- **Key Facts:** A technique of motivational patient interviewing by pharmacists in the pharmacy setting, developed at the University of Missouri-Kansas City, is intended to improve patient medication adherence by cultivating patient self-sufficiency and improving overall health behavior. The program consists of a patient-centered style of counseling intended to be positive, empathetic, and nonconfrontational. In the program, pharmacists or pharmacy students are trained to engage patients in brief interviews lasting 5 minutes or less after dispensing medication. Pharmacists are instructed on interviewing techniques and strategies for identifying possible patient resistance or other adherence issues, exploring those issues with the patient, and offering counseling and encouragement regarding medication adherence.

- **Key Expert Comments:** Experts commenting on this topic agreed that this intervention has the potential to address a significant unmet need for improving patient medication adherence and identifying in advance potential barriers to adherence. Experts also generally agreed this intervention is very likely to be accepted by clinicians and patients alike because of the ease of implementation, the willingness of patients to be educated about their medications, and potential to lessen the burden of care that rests on the prescribing physician. However, some experts commented that this intervention may not be accepted by certain patients who are uncomfortable with face-to-face counseling by a pharmacist.

- **Potential for High Impact:** Moderately high

Partnering Urban Specialists With Rural Primary Care Clinicians for Treatment of Complex, Chronic Conditions

- **Key Facts**: Project ECHO™ (Extension for Community Healthcare Outcomes, developed at the University of New Mexico Health Sciences Center, Albuquerque) is a program intended to improve access to specialty care in underserved areas by enabling primary care clinicians in rural or underserved areas to develop more capacity to safely and effectively manage cases in their communities of patients who have chronic, common, and complex diseases. The program uses telehealth technology and clinical management tools to train and support rural primary care providers in developing knowledge about diseases that would typically fall within the realm of specialty care. A specialist (e.g., from an academic medical center) guides a primary care provider in developing the skills and self-efficacy necessary to treat

the patient. Additionally, during case-based teleclinics, ECHO specialists make brief didactic presentations that are typically relevant to specific issues that arise, with these presentations intended to improve content knowledge. Finally, patient outcomes are monitored through a centralized database. Project ECHO is being studied for its ability to improve management of patients with hepatitis C virus infection or other chronic conditions.

- **Key Expert Comments**: Experts commenting on this topic agreed that this program could fill an important gap and is likely to have a significant impact on patient management models and access to care in rural areas, although some skepticism about the model's sustainability existed because of unanswered questions about long-term funding.
- **Potential for High Impact**: High

Senior-Specific Emergency Departments for Treatment of Elderly Patients

- **Key Facts**: Some health systems are now offering EDs designed to cater specifically to the special needs of the senior population to improve safety, outcomes, and quality of care for elderly patients in the ED and reduce admissions and lengths of stay of elders in intensive care units (ICUs). Senior-specific EDs include both equipment and process of care that are different from that in standard EDs. Senior-specific EDs provide equipment such as reclining chairs and padded or lined stretchers to improve patient comfort and reduce risk of pressure ulcers; large-faced clocks for better visibility; calendars and boards with the names of hospital and clinical staff to reduce risk of patient disorientation and delirium; fall-prevention design such as nonskid floor surfaces, extra handrails, more aisle lighting, and bedside commodes; and visual and lighting aids. Protocol-based patient care interventions include screening for cognitive impairment and delirium as part of routine practice, adopting minimal use of urethral catheters and other "tethering" devices to reduce patient immobility and risk for nosocomial infection and delirium, and creating a staff position for a nursing discharge coordinator to assess the patient's postdischarge care situation and needs.
- **Key Expert Comments**: Experts agreed that the need for senior-specific ED care to improve outcomes, reduce admissions to ICU, reduce length of stay, and lower costs of care and complications represents an important unmet need. Experts thought this model might improve outcomes and health disparities in the target population. Experts had differing opinions about whether this model would achieve the desired outcomes pending availability of more published evidence on outcomes.
- **Potential for High Impact**: Lower end of the high-impact-potential range

Crosscutting Interventions and Programs

Community Paramedicine to Improve Care Access in Rural Areas

Unmet need: Primary care access in rural and remote regions is limited by physician shortages, hospital and clinic closures and mergers, limited public transportation, vulnerable aging populations, increasing cultural and ethnic diversity, economic disadvantage, and poor health status.[1,2] Limited access to primary care can prompt patients to inappropriately use emergency medical services (EMS) and ambulance transport to the emergency department (ED) for issues that are not emergencies, are in the purview of home health care or social service, or are medical issues that could have been prevented if the patient had had regular access to primary care.[2]

Intervention: The community paramedicine model might close the primary-care-access gap by using EMS personnel to augment available services when such personnel are not responding to emergencies.[1] In community paramedicine, EMS personnel (paramedics) provide specific primary care services in a patient's home when EMS personnel are not on emergency calls.[2] The reader should note that this report describes one program in particular (Community Paramedic Program, Western Eagle County, CO), but several other community paramedicine models have been implemented recently across the United States. Although certain aspects of each of these programs differ, their underlying frameworks are similar.

The goals of the Western Eagle County Ambulance District (WECAD) community paramedicine program are to "improve health outcomes among medically vulnerable populations and to save healthcare dollars by preventing unnecessary ambulance transports, [ED] visits, and hospital readmissions."[2] According to the program handbook, the community paramedicine model has two components: primary care services (ordered by a physician and conducted in a patient's home) and community-based prevention services (planned and provided in conjunction with the local public health department).[2]

In the WECAD program, these components are carried out by EMS workers, who have a lot of downtime between emergency calls.[3] During the downtime, EMS workers visit patient homes and provide specific primary care services that are within the paramedic's legal scope of practice and skill set. These services may include assessment (vital signs, blood pressure, labs, medication compliance), treatment (wound care, medication reconciliation), prevention (immunizations, fall assessment), and referral (medical and social services). Patients are referred to the program via physician order. Care provided under the WECAD program is not intended as ongoing care management, and each visit requires a separate physician's order. After each visit, the paramedic completes a patient care report and faxes it to the ordering provider for the patient's chart. If the paramedic deems that immediate physician intervention is necessary, he or she calls the ordering physician while at the patient's home. The WECAD program developers note that community paramedicine is not intended to replace current home-health services, such as home-health care rendered by primary care physicians. Instead, the program is intended to be an "extension of the primary care provider to provide care to patients without access."[2]

Clinical trials: Although no ongoing trials of these paramedicine programs were identified in the National Clinical Trials database, researchers who studied the outcomes of a paramedicine intervention in an England-based trial of 3,018 patients older than 60 years of age concluded that, "Overall, patients in the intervention group were less likely to attend an emergency department (relative risk 0.72, 95% confidence interval [CI] 0.68 to 0.75) or require hospital admission within 28 days (0.87, 0.81 to 0.94) and experienced a shorter total episode time (235 v 278 minutes, 95% confidence interval for difference −60 minutes to −25 minutes). Patients in the intervention group

were more likely to report being highly satisfied with their healthcare episode (relative risk 1.16, 1.09 to 1.23). There was no significant difference in 28-day mortality (0.87, 0.63 to 1.21)."[4]

Program developers and funding: The WECAD community paramedic program was created in partnership with the Eagle County Public Health Agency, local physicians, and the International Roundtable on Community Paramedicine.[2] Costs, funding, and reimbursement policies vary from program to program. Patients enrolled in the WECAD program are not charged for services; the program is funded by State monies.[3]

Diffusion: Community paramedicine programs have been implemented in California, Colorado, Minnesota, Nebraska, North Carolina, Pennsylvania, and Texas.[2] Each of these programs operates slightly differently and offers different services because the programs are based on specific community needs.[2]

Current Approach to Care

EMS personnel are intended to be emergency responders who provide acute care.[2] However, nationwide shortages of primary care physicians often lead to patient use of an EMS to access EDs for routine health care services, despite the fact that a primary care setting would provide patients with more appropriate and cost-effective care.[2,5] Community paramedicine might increase access to primary and preventive care, provide wellness interventions within the medical home model, decrease ED use, save health care costs, and improve patient outcomes.[5]

Figure 1. Overall high-impact potential: community paramedicine to improve care access in rural areas
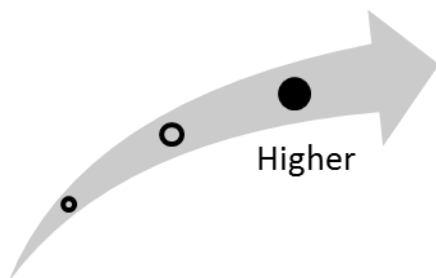
Experts commenting on this intervention were extremely enthusiastic about this program's potental to address the unmet need for improved provider access in rural areas. Experts thought that this program would have marked effects on health disparties and would be likely to improve patient health outcomes over the long term. Experts also noted that the program would fundamentally alter the way patients are managed and could save costs by reducing unnecessary or inappropriate ED visits and hospital admissions. Based on this input, our overall assessment is that this intervention is in the higher end of the high-impact-potential range.

Results and Discussion of Comments

Six experts, with clinical, research, and health systems backgrounds, offered perspectives on this intervention.[6-11] We organized the following discussion of expert comments by the parameters on which they commented.

Unmet need and health outcomes: The unmet need this intervention is intended to address is important because a large number of patients are affected, the experts generally agreed. They cited issues of lack of primary care resources, the associated poor health outcomes, and the costs affiliated with unnecessary emergency medical resource use.

Most of the experts also agreed that this intervention could be successful in meeting this need, although some appeared to base this opinion on the potential of the intervention more than on available data thus far. For example, one clinical expert noted, "This program has the potential to offer a bridge to the challenge of accessing fundamental services at lower costs and under safe conditions," and may "significantly improve patient health because it may allow for more frequent monitoring of complex patients and may also offer ready access to some preventive services."[9]

However, another clinical expert suggested that this intervention may not be effective, stating that "EMS and its providers are inappropriate for primary care delivery even under the supervision of a physician. EMS staff are minimally trained professionals and could provide only marginal primary care services."[6] This expert suggested that a preferable strategy would be to expand the availability of primary care nurse practitioners, noting that they are "geared toward primary care delivery in a way that EMS is fundamentally inappropriate for."[6]

Health disparities: This intervention's greatest impact could be in improving health disparities by increasing access to some level of primary care, the experts thought.

Acceptance and adoption: Both physicians and patients would likely accept this care approach, most, but not all, of the experts agreed. They thought that physicians would likely appreciate the support to care for patients in their homes and the reduced workload that this program might offer. But a couple of experts suggested that some clinicians may push back because they may see this program as "competition" or may be inconvenienced by phone calls and managing care through EMS personnel.

Health care delivery infrastructure and patient management: This intervention could have notable impacts on the way patients are managed, experts thought, because it would shift care from the ED to a home-care setting, shift some responsibility for patient care from emergency and primary care physicians to paramedics, and place additional emphasis on ongoing and preventive care, rather than episodic emergency care.

With regard to costs, experts also suggested that this program could have important ramifications. Although implementing the program might initially increase care costs, this initial financial outlay could be recouped over time as inappropriate ED visits and hospitalizations and readmissions are reduced, several experts noted. As one clinical expert noted, this intervention "could have a significant impact on healthcare costs by allowing for less expensive services to be delivered in a home setting rather than an expensive ER."[9]

Intelligent Pills (Proteus Digital Health Feedback System) to Monitor Patient Medication Adherence

Unmet need: Patient adherence to prescribed medication regimens in the proper sequence, dose, and timing is one of several important factors in achieving effective medical therapy for patients with a chronic disease. According to the World Health Organization, the average medication adherence rate among patients with chronic diseases in developed nations is only 50%.[12] Technologies are needed that could aid patient adherence to medication regimens for chronic diseases.

Intervention: The Proteus Digital Health Feedback System is a networked medication adherence–monitoring system intended to aggregate data pertaining to patient medication use (and other metrics) into tools that can be used by patients and health care providers to track and optimize adherence to recommended medication dosages.[13] Three main components comprise the system: The ingestible sensor, a personal monitor, and a mobile phone or Web-based communication platform.

The ingestible sensor (formerly known as Ingestible Event Marker or IEM) is a 1 mm^2 microfabricated chip sensor that a manufacturer can embed into any oral medication to be swallowed by the patient. The sensor is made of "materials found in the food chain," such as silicon, copper, magnesium, minerals, and cellulose. When the patient swallows the sensor, the chip is released from the medication and activated by stomach fluids, which power the ingestible sensor. Once activated in the body, the sensor transmits digital information regarding the drug taken, its dose, and time of ingestion.[13,14] This information is captured by the system's second component, a wearable personal monitor. After about 7 minutes of activation, the ingestible sensor becomes inactive and is subsequently excreted through fecal elimination.

The personal monitor is a wearable, adhesive, soft foam, skin-patch device (measuring 5 by 11 by 1 cm) that records the information sent from the ingestible sensor and that can also be used to measure additional physiological metrics, such as heart rate, respiration, activity, body position, and monitor-wearing compliance. The personal monitor then transmits this information (via Bluetooth telemetry) to a computing device.[14] The monitor, which is battery operated and looks like an adhesive bandage, is designed to be worn for 7 days.[14,15]

The third component is a mobile phone or Web-based communication platform that is used to view the data transmitted by the ingestible sensor and captured by the personal monitor. The data is sent securely to either the mobile phone or to Web-based platform, where it can be viewed by the patient, family members, caregivers, or health care providers.[14]

According to developers, the intended purpose of this system is: "[T]o confirm the ingestion of individual oral medications and doses, to integrate this adherence data with physiological parameters and wellness metrics, to offer patient-directed sharing of health information with caregivers and providers, and to incorporate individualized behavior support tools."[14] The researchers state that one benefit of the system lies in its ability to give health care providers "improved knowledge of a patient's adherence."[14] With access to objective medication-adherence data, providers could determine whether their clinical management of a patient "should focus upon improving medication adherence, dose adjustment, drug substitution, or polypharmacy"[14] or other factors affecting adherence, such as cost or side effects.

Clinical trials: In reporting results of a clinical trial of 111 subjects who ingested 7,144 ingestible markers, investigators reported that "the system's positive detection accuracy and negative detection accuracy in detecting ingested markers were 97.1% and 97.7%, respectively. It differentiated 100% of multiple drugs and doses taken simultaneously by type and by dose.

Medication adherence was >85%. The most common adverse effect was mild skin rash from the monitor's electrodes. No definitive marker-related adverse effects were reported."[14]

Manufacturer and regulatory status: Proteus Digital Health, Inc., of Redwood City, CA, makes the system. Its components are regulated separately. In March 2010, the manufacturer received 510(k) clearance from the U.S. Food and Drug Administration (FDA) to market the Raisin Personal Monitor to record heart rate, activity, and patient-logged events.[16] In July 2012, FDA granted a de novo clearance for the Proteus Ingestible Event Marker.[17] The company received Conformité Européene (CE) mark approval to market the complete system, including the ingestible sensor and personal physiologic monitor, in the European Union in August 2010.[18]

Clinical Pathway at Point of This Intervention

The use of this technology would be incorporated into long-term medical management of patients with chronic disease requiring frequent self-administered oral medications. Patients would continue to take their medications in the same manner as before, as instructed by their physicians. However, using the personal monitoring technology provided through a "smart" pill is intended to provide physicians with more and timely data on whether patients are taking their prescribed medications as directed; physicians can then monitor patients' physiologic parameters to monitor response to medication use.[19]

Figure 2. Overall high-impact potential: intelligent pills (Proteus Digital Health Feedback System) to monitor patient medication adherence

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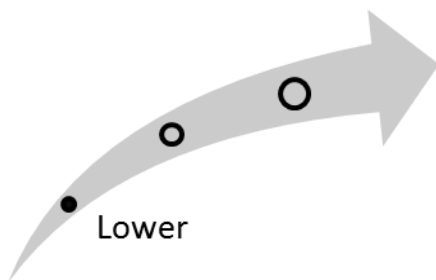
A couple of experts who commented on this topic were skeptical about its potential to improve patient medication adherence and health outcomes, but most of the experts commenting generally thought that this intervention could have a significant impact on many health system parameters. These experts also believe more data are needed to properly assess whether this technology will result in improved patient health outcomes. Based on this input, our overall assessment is that this intervention is in the lower end of the high-impact-potential range.

Results and Discussion of Comments

Seven experts, with clinical, research, health systems, and health administration backgrounds, offered perspectives on this intervention.[20-26] We organized the following discussion of expert comments by the parameters on which experts commented.

Unmet need and health outcomes: The experts agreed that an important unmet need exists for ways to improve patient adherence to prescribed medication regimens and that a monitoring system might be one tool that could improve adherence while acknowledging that several other variables affect adherence that would not be addressed by such a system. One clinical expert mentioned that about 50% of patients with chronic diseases experience prescription adherence issues.[23] One research expert specifically highlighted the fact that prescription nonadherence can result in nearly

$300 billion yearly in preventable health care expenses.[25] One clinical/community health expert stated that this intervention might be particularly useful in diseases in which medication adherence has a direct effect on public health, such as in cases of drug-resistant tuberculosis.

The majority of experts were uncertain about this device's potential to improve patient health outcomes, citing a lack of data at this point and uncertainty about its true impact on adherence. These experts are eager to see more and longer-term data to validate these claims.[20-26] One expert stated that the "active nature" of the system could keep patients more engaged in adhering to their drug regimens.[22]

Acceptance and adoption: Most experts thought adoption of the system by patients might be hindered by the system requirements. One research expert explained, "Given the fact that patients will need to obtain the adherence monitoring system…and wear a personal monitoring device to capture the data transmitted by it, acceptance, at least at first, may not be universal."[25] Several experts cited cost as a potential barrier to patient adoption as well. However, one research expert envisions this device being accepted by elderly patients, especially those living alone.[21] In terms of clinician acceptance, most experts agreed clinicians would initially view this technology as a burden, requiring them to spend time on patient monitoring, followup, and education than they are not spending now. One clinical expert states, "This innovation may have the [p]otential to drive a wedge in the important clinician-patient relationship. The focus could shift from securing patient understanding and 'buy-in' to a focus on family and friends to coerce the patient into compliance."[24] One research expert explained that barriers to clinician adoption might be likely, given the added work in analyzing patient data, and that clinician acceptance might increase if reimbursement for this technology were available and if it saved health care costs by improving patient outcomes.[22]

Health care delivery infrastructure and patient management: Experts speculated that the technology has the potential to affect patient case management, although they agreed that the various ways in which clinicians would intervene with patients who do not adhere to treatment recommendations remains to be seen. If the onus of improving patient adherence falls on the provider, staffing needs might increase because staff might need to spend additional time counseling nonadherent patients.

Experts suggested the technology would have minimal effect on health care costs if adoption is highly selective or limited; however, if adoption is focused on the patients with the most complex medication regimens and patients identified as mostly likely to have adherence issues, it could reduce costs of care by averting complications of not following a regimen. One research expert thought that if costs were comparable to this technology's cost in the United Kingdom, roughly $80 per month, using the system would not greatly increase costs.[25] However, another research expert opined that this technology "could potentially have a larger financial impact if more data show it can actually can cut costs by reducing complications through better adherence."[22]

Health disparities: Experts generally agreed this technology is not likely to reduce health disparities, citing per-patient costs associated with this system as one major barrier. Further, several experts thought this technology has potential to increase disparities between patients unwilling to use it and technology-savvy patients. For example, one research expert opined that patients who are less "wired" or receptive to using digital technology and less tech-friendly may have a harder time accepting or using the technology.[22] A clinical and community health expert mentioned that this technology would most likely cater to "socially advantaged" populations, stating: "If the systems differentially improved adherences in advantaged populations, health care disparities would probably increase rather than decrease."[20]

Motivational Interviewing in the Pharmacy Setting To Improve Patient Medication Adherence

Unmet need: According to the New England Healthcare Institute, medication nonadherence accounts for approximately $290 billion in avoidable medical spending per year.[27] Multiple pharmacies throughout Pennsylvania and at the University of Missouri-Kansas City have implemented a patient-centered style of counseling to improve patient medication adherence. Motivational interviewing in the pharmacy setting purportedly affects medication adherence and other health issues such as substance abuse, physical exercise, and health screenings.

Intervention: Motivational interviewing in the pharmacy setting is intended to improve patient medication adherence by cultivating patient self-sufficiency and overall health behavior. The program consists of a patient-centered style of counseling intended to be positive, empathetic, and nonconfrontational. In the program, student or professional pharmacists are trained on how to engage with patients for brief interviews, which are shorter than 5 minutes, after dispensing medication. Pharmacists are instructed on interviewing techniques and strategies for dealing with perceived patient resistance to medication adherence.

Clinical trials: Taitel and colleagues presented results from a retrospective, cohort study evaluating the impact of pharmacist face-to-face counseling to improve medication adherence among patients initiating statin therapy. Authors reported results "at 12 months the intervention group had a medication process ratio (MPR) of 61.8% (CI, 54.5%–69.2%) and the comparison group had a MPR of 56.9% (CI, 49.5%–64.3%); this 4.9% difference is significant (P , 0.01). The 12 month categorical MPR also showed significant differences between groups (X 2 = 6.12, P , 0.05); 40.9% of the intervention group and 33.7% of comparison group had a MPR greater than or equal to 80%. Finally, the intervention group had significantly greater persistency with their medication therapy than the comparison group at 60, 90, 120, and 365 days."[28]

In 2011, Heisler and colleagues presented results from a randomized, controlled trial evaluating the effect of pharmacist-led motivational interviewing-based behavioral counseling approaches. Researchers assessed the impact on the relative change in systolic blood pressure (SBP) measurements of the interventional group compared with SBP in the control group. Authors reported "Mean SBP of intervention team patients one month prior to the intervention was 151 mm Hg compared to 150 in control teams (p=.33) Changes in mean SBP after intervention team participants received the intervention were -4.4 mm Hg compared with -1.9 among eligible control team patients (P <.001). By six months after the intervention period, mean SBP was approximately 145 mm Hg among both intervention and control team patients."[29]

Program developers and funding: Several medical schools have developed motivational interviewing training programs. For example, the University of Pittsburgh School of Medicine (Pittsburgh, PA), Highmark Blue Cross Blue Shield (Pittsburgh, PA), and Rite-Aid Corp. (Camp Hill, PA) have collaborated to develop such a program in Pennsylvania.[30] The program development was spearheaded by Janice Pringle, Ph.D., director of the program evaluation research unit at the University of Pittsburgh School of Medicine.[30] The University of Missouri-Kansas City has developed a course to train Doctor of Pharmacy (PharmD) degree candidates to perform patient-centered interviews in the pharmacy setting.[31]
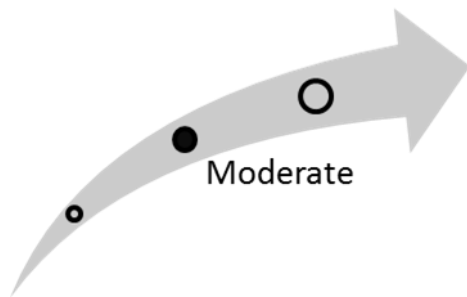
Diffusion: Motivational interviewing in the pharmacy setting has been performed at many retail pharmacies throughout Pennsylvania and the northeast United States. Collaborative efforts from the University of Pittsburgh, Highmark Blue Cross Blue Shield, and drugstore company Rite Aid have introduced motivational interviewing to about 120 retail locations through a pilot study to improve

patient medication adherence.[30] Walgreen Co. (Deerfield, IL) piloted a study in Walgreens pharmacies to determine the effectiveness of pharmacist counseling on patient medication adherence.[28]

Current Approach to Care

Using interventions to improve patient medication adherence in clinical practice is considered to be infrequent and inconsistent. Clinicians may choose to use one of many available medication adherence interventions or a combination approach, with the latter purported to be more effective.[32,33]

Figure 3. Overall high-impact potential: motivational interviewing in the pharmacy setting to improve patient medication adherence

Experts commenting on this intervention generally agreed that the unmet need it purportedly addresses is important. Experts thought that both clinicians and patients would be likely to adopt this intervention. The program has the potential to significantly improve patient medication adherence and ultimately improve patient health outcomes. most experts suggested. However, some experts suggested that clinician acceptance and adoption could be affected if funding is not available to compensate pharmacists for added work time. Based on this input, our overall assessment is that this intervention is in the moderate high-impact-potential range.

Results and Discussion of Comments

Six experts, with clinical, research, and health systems backgrounds, offered perspectives on this program.[34-39] We organized the following discussion of expert comments by the parameters on which they commented.

Unmet need and health outcomes: The experts strongly agreed that the unmet need that this intervention purportedly addresses is very important, citing the annual cost burden attributed to patient medication nonadherence in the United States. One clinical expert opined that more than 50% of patients experience issues with medication adherence.[39] One research expert specifically highlighted the fact that prescription nonadherence can result in nearly $300 billion yearly in preventable health care expenses.[37] An expert with a health systems perspective stated that this intervention would benefit patients who are at risk of failing to adhere to medication recommendations.[38]

Most experts agreed that this intervention has potential to improve patient outcomes, although some experts noted the lack of published outcomes data. These experts are interested in seeing further study results to determine whether this intervention can significantly improve patient health outcomes.[34-36] One expert with a health systems perspective stated, "Patient outcomes will be affected by reducing hospital inpatient readmissions and avoiding complications arising from non-compliance with medication dosing."[38]

Acceptance and adoption: Experts generally agreed that both physicians and patients would likely accept this intervention. They noted the potential for improved patient outcomes and the reduced number of hospital admissions attributed to successful medication adherence. Some experts expressed concern about funding to compensate pharmacists for added work,[35,36,38] but one research expert noted, "This intervention will be implemented by pharmacists who should widely accept the program due to the potential benefits to improved adherence and ultimately improved patient outcomes."[37] Most experts opined that this intervention has the potential to be widely accepted by patients because of pharmacist accessibility. However, some experts questioned whether patients would be willing to engage in face-to-face counseling for an extended period of time.[35,37,39]

Health care delivery infrastructure and patient management: This intervention would have minimal impact on the way patients are managed, experts thought. They commented that adding a counseling session lasting about 5 minutes for both clinicians and patients would not create a significant disruption to health care delivery infrastructure and patient management.[35,37,38] One research expert opined, however, "this could have a major impact on patient management if there are fewer unplanned ED visits and fewer emergency treatments."[35] One expert with a health systems perspective commented that "the use of this intervention on a national scale will support the current efforts of the Centers for Medicare and Medicaid Services (CMS) to reduce and prevent hospital readmissions."[38] However, some experts were concerned about pharmacists' willingness to accept this intervention as an added responsibility without reimbursement.[36,39]

Health disparities: This intervention might have a significant impact on health disparities because cultural disparities experienced by certain patient populations (e.g., those of low socioeconomic status) can play a role in patient medication adherence, most of the experts thought. Experts generally agreed that this intervention has the potential to benefit patients who experience chronic diseases. However, some experts noted that challenges might arise when counseling patients with limited English proficiency if multilingual pharmacists are not available when and where needed.[36,38,39]

Partnering Urban Specialists with Rural Primary Care Clinicians for Treatment of Complex, Chronic Conditions

Unmet need: Patients with chronic or complex diseases living in rural or medically underserved areas (e.g., prisons) where specialty care is in short supply or unavailable might experience substandard care because of access barriers, specialist shortages, geographical isolation, and other factors.[40] Project ECHO™ (Extension for Community Healthcare Outcomes) is intended to address the unmet need of access to specialty care by helping primary care clinicians in rural or underserved areas develop more capacity to safely and effectively manage patients in their communities who have chronic, common, and complex diseases.[40]

Intervention: Project ECHO is a health care delivery model developed at the University of New Mexico (UNM) Health Sciences Center (Albuquerque). It is intended to help develop rural communities' "capacity for safe and effective treatment of chronic, common, and complex disease in rural and underserved areas while monitoring outcomes to ensure quality of care."[40] The program uses telehealth technology and clinical management tools to train and support rural primary care providers in developing knowledge about diseases that would typically fall within the realm of specialty care. According to program developers, this model enables providers to "deliver best-practice care for complex health conditions in federally qualified health centers and other community-based sites where this specialty care was previously unavailable."[40]

Project developers created the model to address the problem of hepatitis C virus (HCV) infection in New Mexico and have used that disease as a framework for describing the model's execution. A partner site (e.g., a rural primary care practice) joins the network, at which point ECHO staff visit the site and conduct an orientation. This orientation includes an explanation of the HCV treatment protocol, the communications technology to be used, and the "case-based presentation format for the weekly 2-hour telemedicine clinics."[40]

Then, clinicians are organized into "disease-specific learning networks that meet weekly via videoconference to present cases." For the HCV model, the specialty team included a hepatologist, a pharmacist, a psychiatrist, and a nurse.[40] Also called "virtual grand rounds" or "teleclinics," these conferences are led by specialists at academic medical centers who review and discuss cases with the rural clinicians and work with them to manage patients' care according to evidence-based protocols.[40,41] The program developers note that the specialists do not assume the care of patients, but instead guide the primary care provider in developing the skills and self-efficacy necessary to treat the patient.[40] Additionally, during the case-based teleclinics, ECHO specialists make brief didactic presentations that are typically relevant to specific issues that arise, with these presentations intended to improve content knowledge.[40,41] Lastly, patient outcomes are monitored through a centralized database.[40]

According to project developers, the model's case-based approach is designed to create a multilevel "learning loop" that allows primary care providers to: (1) "learn by doing," using the guided feedback from specialists; (2) "learn from each other" by interacting with other community-based primary care providers through the network; and (3) "learn from specialists" through the didactic presentations given by ECHO specialists.[40,41]

Clinical trials: Project ECHO is under study as a way to improve management of patients with HCV infection or other chronic conditions.[40] In a 2011 trial comparing the treatment of 407 patients with chronic HCV infection (who had received no previous treatment for the infection) at the UNM HCV clinic or by primary care clinicians at ECHO sites in rural areas and prisons in New Mexico, published results state: "A total of 57.5% of the patients treated at the UNM HCV clinic (84 of 146

patients) and 58.2% of those treated at ECHO sites (152 of 261 patients) had a sustained viral response (difference in rates between sites, 0.7 percentage points; 95% confidence interval, -9.2 to 10.7; p=0.89). Among patients with HCV genotype 1 infection, the rate of sustained viral response was 45.8% (38 of 83 patients) at the UNM HCV clinic and 49.7% (73 of 147 patients) at ECHO sites (p=0.57). Serious adverse events occurred in 13.7% of the patients at the UNM HCV clinic and in 6.9% of the patients at ECHO site."[41]

Program developers and funding: As of May 2013, one third-party payer offered reimbursement to primary care providers participating in Project ECHO.[42] Reimbursement for providers by Molina Healthcare of New Mexico (Albuquerque) is $150 for the presentation of a Molina member to any Project ECHO clinic.[42]

Diffusion: According to the project's developers, 298 ECHO teams had been formed in New Mexico to deliver specialty care for conditions including HCV infection, asthma, chronic pain, diabetes and cardiovascular risk reduction, high-risk pregnancy, HIV/AIDS, pediatric obesity, rheumatology, substance abuse disorders, and mental illness.[40] The model is being replicated at the University of Washington (Seattle), focusing on treatment of HCV for providers serving Native American populations and rural sites (e.g., migrant health worker clinics, family health centers), and at the University of Chicago (IL), focusing on managing heart disease in African-American men.[40] The Veterans Health Administration is reportedly incorporating the Project ECHO model into its care infrastructure for veterans.[43]

Current Approach to Care

Ideally, chronic, complex diseases (e.g., HCV infection) are treated by specialty care clinicians in academic medical centers or major hospitals.[40] Project ECHO is intended to extend the reach of such specialty care to patients in rural or underserved areas where patients would otherwise face barriers to receiving this care. Because of the program's focus on technologic communication, it might compete with or complement other telemedicine programs, such as those initiated by the Indian Health Service and the Veterans Health Administration, which use telemedicine delivery systems to serve large underserved populations.[44]

Figure 4. Overall high-impact potential: partnering urban specialists with rural primary care clinicians for treatment of complex, chronic conditions
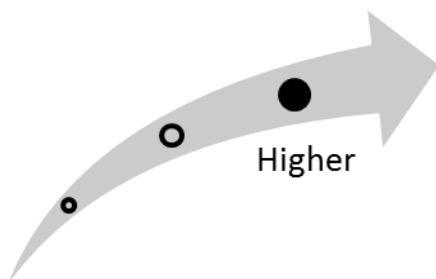
Experts commenting on this intervention agreed that it addresses an important gap in the health care system and is likely to have a significant impact on patient outcomes and access to care in rural areas. Health disparities may be particularly affected, and clinicians and patients alike are expected to accept this program. Some experts suggested that the long-term viability of this program will depend on funding support, either from the government or other sources. Based on this input, our overall assessment is that this intervention is in the higher end of the high-impact-potential range.

Results and Discussion of Comments

Six experts, with clinical, research, and health systems backgrounds, offered perspectives on this program.[45-50] We organized the following discussion of expert comments by the parameters on which they commented.

Unmet need and health outcomes: The experts strongly agreed that the unmet need that this intervention purportedly addresses is very important, citing the considerable lack of access to specialty care in rural or otherwise underserved areas. This access gap is likely to become even more pronounced, one clinical expert pointed out, noting that fewer medical students are choosing to enter primary care practice but that recent policy changes will increase the number of patients seeking care.

However, most experts believe that this intervention has potential to improve patient outcomes, basing their opinions on both the trial data available and its underlying theory. Multiple experts pointed out that although evidence is limited to a single trial, its data showed improved patient health outcomes with Project ECHO and may have actually shown better outcomes than care received in academic medical centers.

Acceptance and adoption: The initial technology infrastructure, training, and new staffing resources that this program can require will pose a small, but likely not insurmountable, obstacle to diffusion, some of the experts noted.

Health care delivery infrastructure and patient management: This program would have a notable impact on the way cases are managed across several dimensions, several experts suggested. They noted that patients would be able to receive care closer to home and, thus, might be expected to seek care sooner. Additionally, case volume in rural practices might be expected to increase as more patients participate in the program. However, a couple of experts stated that because the rural physicians would be, to a large degree, providing standard and accepted chronic care, patient management may not change in terms of care protocols.

Although experts were extremely optimistic about this program's potential to improve access to specialist care for patients in rural areas and its potential to improve health outcomes, several experts also expressed skepticism about the program's long-term sustainability. Most experts raised the issue of funding and noted that this program will require either government funding or favorable reimbursement policies from third-party payers.

Health disparities: This intervention has potential to dramatically affect health disparities, especially because it is intended to improve access to specialist services for patients with barriers to receiving this care, the experts agreed. As one research-based expert stated, "the proposed intervention brings care to patients who otherwise will go without treatment."[45] Furthermore, two experts pointed out that this intervention would provide a mechanism for delivering culturally appropriate care for various subpopulations.

Senior-Specific Emergency Departments for Treatment of Elderly Patients

Unmet need: As the U.S. population ages, seniors (i.e., individuals aged 65 years or older) are increasingly seeking care in EDs. However, EDs are not typically optimally equipped to handle the unique needs of this population, and after an ED visit, seniors are at greater risk than before the visit for medical complications, functional decline, hospital readmission, longer time spent in an intensive care unit when admitted, and poor health-related outcomes. EDs that are designed to address the special needs of the senior population might help address these challenges and improve care and outcomes for elderly patients in the ED.[51]

Intervention: Authors from several institutions have described models for senior-specific EDs, which are intended to "use specific interventions to improve patient satisfaction, comfort, and outcomes" in patients who are elderly.[51-53] Although approaches to constructing or repurposing an ED space for seniors vary, one model described by researchers at Brookdale and Mount Sinai illustrates the kinds of design and approach (geriatric emergency department interventions [GEDIs]) that a senior-specific ED might entail.[51]

GEDIs can be divided into two main types: structural modification and protocol intervention.[51] (Other authors have described different categories; for example, the Northern Ontario School of Medicine of Sudbury and Thunder Bay, Ontario, Canada, developed a framework that divides interventions into those that address the physical environment, the social climate, hospital policies and procedures, and the health care system.)[54]

According to clinical researchers, structural GEDI modifications that will make an ED more "senior-friendly" include reclining chairs or padded or lined stretchers to improve patient comfort and reduce pressure ulcers; large-faced clocks for improved visibility; calendars; boards with the names of hospital and clinical staff to reduce risk of patient delirium; fall prevention measures such as nonskid floor surfaces, handrails, aisle lighting, and bedside commodes; and visual and lighting aids that might reduce risk of delirium.[51]

Clinical protocols that have the potential to improve the elderly patient's outcomes include screening for cognitive impairment and delirium as part of routine practice, to identify early the patients who are at risk for these conditions and to assist in disposition, treatment, or discharge planning. Also deemed important is routine screening for risk of adverse health outcomes, return visits, or hospitalization; minimizing use of urethral catheters and other "tethering" devices that reduce patient mobility and increase risk of nosocomial infection and delirium; and creating a staff position for a nursing discharge coordinator to improve continuity of care, decrease the need for return visits, and increase patient satisfaction.[51]

Diffusion: The creation of senior specific EDs and GEDIs has steadily increased over the past 2 years, as data begin to accumulate about the impact on outcomes of geriatric-centered ED care. The American Hospital Association has started to list health systems that have developed senior-specific EDs.[55] Among the health systems that have developed the senior-specific EDs are Brookdale Department of Geriatrics and Adult Development at the Mount Sinai School of Medicine in New York; Holy Cross Hospital in Maryland; Mercy St. Anne Hospital in Ohio; Park Plaza Hospital and Medical Center in Texas; St. Joseph Healthcare System in northern New Jersey; St. Joseph Mercy Health Systems in Michigan; Roger Williams Medical Center and Fatima Hospital in Rhode Island; and University Hospitals' Bedford and Richmond Medical Centers in Ohio.

Infrastructure and staffing: The reportedly first "Seniors Emergency Center" implemented in the United States (Holy Cross Hospital, Silver Spring, MD) illustrates how these interventions are being

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put into practice. The hospital created a separate, enclosed area of the ED specifically designed to meet the needs of seniors. Structural and environmental modifications include the use of special lighting, soft colors, and noise abatement features, handrails, flooring that is less likely to cause falls, thicker bed mattresses, telephones with larger buttons, and speakers in the bed pillows. The hospital also states that the care team at the center includes (in addition to physicians) a geriatric nurse practitioner, registered nurses trained in geriatrics, and a geriatric social worker.[53] The hospital states that unit staff receive training in both geriatrics and communication with elderly adults.[56]

Current Approach to Care

According to clinical researchers from Brookdale and Mount Sinai, space in the ED is designed for quick patient evaluation and turnover, with a physical layout designed to maximize use of available resources.[51] However, this design poses many risks to the elderly population, including falls. Other design features that might pose a risk to the elderly include the narrow stretchers with thin mattresses that patients lie on while awaiting admission or tests, which increases risk of a patient developing pressure ulcers; fluorescent lighting and a lack of windows, which promote disorientation in cognitively impaired older adults; and noise from monitor alarms, clinical staff, and other patients, which contributes to worsening delirium and communication difficulties in the potentially hearing-impaired population.[51]

From a clinical point of view, traditional ED practice is not optimally suited for the senior population. For example, rapid triage and diagnosis—hallmarks of ED care—are difficult for older patients, who might have multiple comorbidities, polypharmacy, and functional and cognitive impairments. Clinical researchers state that these challenges, combined with the pressure to make rapid diagnoses, can increase the risk of incorrect or missed diagnoses. Further, in an effort to reduce fall risk and the time and energy devoted to cleaning bedpans or changing diapers, ED staff often insert bladder catheters into this patient population, which increases the risk for developing delirium and infection.[51]

Figure 5. Overall high-impact potential: senior-specific emergency departments for treatment of elderly patients
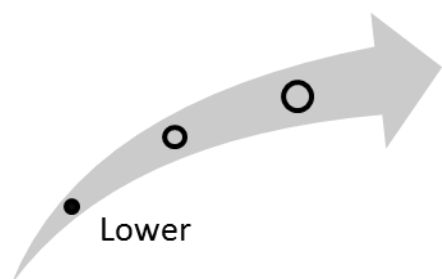
Most experts commenting on this intervention agreed that senior-specific ED care represents an important unmet need, that this model might improve outcomes in the target population, and that this innovation might dramatically affect hospital infrastructure and the manner in which patients are managed. However, expert enthusiasm for the model was tempered by the lack of outcomes data and the opinion that all EDs should incorporate these changes for the benefit of the general population, rather than creating a separate ED with the described upgrades. Based on this input, our overall assessment is that this intervention is in the lower end of the high-impact-potential range.

Results and Discussion of Comments

Seven experts, with clinical, research, and health administration backgrounds, offered perspectives on this program.[57-63] We organized the following discussion of expert comments by the parameters on which they commented.

Unmet need and health outcomes: The need for senior-specific EDs is important, most experts agreed. They noted that the elderly population is sizable and growing and has multiple medical, social, and psychological needs that might not be identified or addressed in the traditional ED. However, a couple of experts suggested that all EDs could benefit from improvements and that rather than create senior-specific EDs, hospitals might want to consider upgrading general EDs with the interventions described in this report.

Although several experts noted the lack of outcomes data regarding this intervention, most experts appeared optimistic about its potential to improve health outcomes in seniors. This support was based on the opinion that offering senior-specific care is "common sense" and is likely to "have a big health impact by improving patient safety (structural changes), focusing care delivery (protocols), and improve follow-up (staff to assist with discharge planning) of geriatric patients."[58,63] However, some experts suggested that most of these interventions could be implemented in general EDs without creating a separate, senior-specific ED and that outcomes for the elderly population would still be expected to improve.

Infrastructure and staffing: Most experts agreed that creating a senior-specific ED would require substantial infrastructure changes whether renovating and building new ED rooms, and the initial cash outlay would be substantial, they opined. Also, staff would need training on ways to engage effectively with seniors to assess their needs and risks. Some experts suggested that hospitals might recoup some of the costs by reducing readmissions and shortening length of stays for seniors who are admitted. Although some experts thought that these EDs would be readily accepted by seniors who would appreciate being treated in a senior-specific facility, other experts stated that seniors would be unlikely to travel out of their way to a senior-specific ED if other EDs are located in closer proximity and that the success of these EDs would require marketing efforts on the part of the hospital.

Health disparities: Experts agreed that senior specific EDs will affect health disparities, but opinions varied on whether this change would reduce disparities. On one hand, some experts noted that this intervention would likely improve access to and quality of care for seniors visiting an ED. On the other hand, other experts expressed concern for worsening disparities, noting that only some hospitals would offer this approach, which might widen disparities within the senior population. Further, diverting financial resources to this approach could reduce funds needed to close disparity gaps for other vulnerable populations.

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